U.S. DEPARTMENT OF ENERGY | Nuclear Energy

Nuclear Energy Enabling Technologies
Reactor Materials

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Overview

Vision

- The NEET-RM will enable the development of innovative and revolutionary materials and provide broad-based, modern materials science that will benefit DOE-NE's mission.

Goal

- Bring about revolutionary improvements in safety, performance, reliability, economics, and proliferation risk reduction and promote creative solutions to the broad array of nuclear energy challenges related to reactor and fuel cycle development through innovative materials development, promoting the use of modern materials science and establishing new, shared research partnerships.

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Program Outcomes

- **FY 2014**
  - Fund proposals to advanced joining techniques for nuclear reactor materials
  - Fund the acquisition of analytical capabilities needed to support modern material science research at the national laboratories
  - Host the annual NE Coordinated Materials Research Meeting webinars

- **FY 2015**
  - Fund the acquisition of analytical capabilities needed to support modern material science research at the national laboratories
  - Fund proposals to develop innovative materials for use in current/future nuclear reactors and fuel cycles.
  - Host the annual NE Coordinated Materials Research Meeting webinars

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Innovative idea development is intended to follow a SBIR approach

2012 2013 2014 2015 2016

Great idea 2012-1
Great idea 2012-2
Great idea 2012-3

Great idea 2012-1
Great idea 2012-3

Great idea 2013-1
Great idea 2013-2
Great idea 2013-3

Great idea 2013-2 transferred to SFR!

Great idea 2014-1
Great idea 2014-2

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Coordination Across NE

- **Representatives from these programs on the federal and laboratory side work together to determine the direction and foci of NEET-RM**
  - Fuel Cycle Research and Development
    - F. Goldner and S. Maloy (LANL)
  - Advanced Reactors
    - W. Corwin and S. Sham (ORNL)
  - Next Generation Nuclear Plant
    - W. Corwin and R. Wright (INL)
  - Light Water Reactor Sustainability
    - S. Lesica/R. Reister and J. Busby (ORNL)
- **Input from SC, NNSA, NRC, etc.**

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Research Competition

- Seeking applications for advanced materials discovery and development. Successful completion of awards will provide piping, structural, or clad materials that dramatically improve performance over traditional materials used advanced fission reactors and in the nuclear fuel cycle. Specific goals may include:
  - Improvement in mechanical performance by a factor of 5-10 over traditional materials
  - Increase in maximum operating temperature of greater than 200 C over an 80 year lifetime
  - Increased radiation tolerance to beyond 300 dpa

- **High-risk/reward and transformational concepts are appropriate for NEET.**

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Infrastructure Competition

- **The key components to modern materials science include computational techniques, experience, and modern tools and research techniques.**

- **The objective of this competition is to provide resources that will expand capabilities for all programs and efforts.**
  - Strategic investments in new tools for modern materials science will be evaluated to benefit the entire NE portfolio.

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